QK
188
.V38
2007

# CANOTIA

## Volume 3, issue 2

## Contents

**Vascular Plants of Arizona: Anacardiaceae**

John L. Anderson ..... 13

**Vascular Plants of Arizona: Bromeliaceae**

Raul Gutierrez, Jr. ..... 23

**Vascular Plants of Arizona: Martyniaceae**

Raul Gutierrez, Jr. ..... 26

**Vascular Plants of Arizona: Psilotaceae**

Raul Gutierrez, Jr. ..... 32

June 2007
Vascular Plant Herbarium
School of Life Sciences, Arizona State University

QK
188
.V38
2007

# CANOTIA

Editor: Leslie R. Landrum
P. O. Box 874501
School of Life Sciences
Arizona State University
Tempe, AZ 85287-4501
(les.landrum@asu.edu)

Associate Editor: Orbelia R. Robinson
Botany Department
California Academy of Sciences
875 Howard Street
San Francisco, CA 94103-3009
(orobinson@calacademy.org)

Production Editor: S.T. Bates
School of Life Sciences
Arizona State University
PO Box 874601
Tempe, AZ 85287-4601
(scott.bates@asu.edu)

**Vascular Plants of Arizona Editorial Committee**

University of Arizona
Charles T. Mason
John R. Reeder

Arizona State University
Leslie R. Landrum
Donald J. Pinkava

Northern Arizona University
Tina Ayers

An introduction to the Vascular Plants of Arizona project can be found in Canotia vol. 1. (http://lifesciences.asu.edu/herbarium/canotia.html)

---

**Canotia** publishes botanical and mycological papers related to Arizona. These may include contributions to the Vascular Plants of Arizona project, checklists, local floras, new records for Arizona and ecological studies. All manuscripts are peer-reviewed by specialists. Acceptance for publication will be at the discretion of the editor. At least 30 printed copies of each issue are distributed to libraries in the United States, Europe, and Latin America. Anyone may download copies free of charge at http://lifesciences.asu.edu/herbarium/canotia.html.

**Canotia** is named for *Canotia holacantha* Torr. (Celastraceae), a spiny shrub or small tree nearly endemic to Arizona.

ISSN 1931-3616

THE LuESTHER T. MERTZ LIBRARY

THE NEW YORK BOTANICAL GARDEN
LIBRARY NEW YORK BOTANICAL GARDEN

# ANACARDIACEAE SUMAC FAMILY

John L. Anderson

Bureau of Land Management
21605 N. Seventh Avenue
Phoenix, AZ 85027, USA

Shrubs, small trees, or vines, with resinous or milky sap, sometimes poisonous. LEAVES alternate, simple, trifoliolate or pinnately compound, estipulate. INFLORESCENCES terminal and/or axillary, bracteate, spikes, racemes, panicles, or thyrses. FLOWERS actinomorphic, small, perfect or unisexual, with a ring-shaped nectary disc; sepals five, connate below; petals five, distinct; stamens as many as or twice as many as the petals; ovary hypogynous, unilocular, solitary; styles one to three. FRUIT a drupe—Ca. 77 genera, 600 spp., mainly tropical and subtropical, with some temperate, such as ours. The Anacardiaceae contains members that are important sources of tannins and lacquers, have edible fruits (e.g., mango - *Mangifera*, cashews – *Anacardium*, and pistachio - *Pistacia*), or are used as ornamentals (e.g., sumacs - *Rhus* and smoke tree - *Cotinus*).

1. Fruit reddish or orange, glandular pubescent (tan and resinous in *Rhus lancea*); inflorescences erect in fruit; plants not poisonous; leaflets to 10 cm long ..... ***Rhus***
1' Fruit cream or white, striate, glabrous; inflorescences pendant in fruit; plants poisonous; leaflets to 13 cm long ..... ***Toxicodendron***

## **Rhus** L. Sumac

Shrubs or small trees, to 5 m tall, polygamous (bearing unisexual and bisexual flowers on one plant) or dioecious; bark gray, lenticular. LEAVES simple, trifoliolate or pinnately compound, evergreen or deciduous, coriaceous or thin, entire, lobed or toothed. INFLORESCENCES terminal and/or axillary, bracteate, dense to open spikes, racemes, panicles, or thyrses. FLOWERS sessile, regular; sepals glabrous or pubescent, green or pink; petals cream or yellow, glabrous or pubescent; style three-lobed. FRUITS lenticular-orbicular, reddish to orange, glandular pubescent. —150 spp.; worldwide, subtropical and temperate. (Ancient Greek name for sumac). Barkley F. A. 1937. *Ann. Mo. Bot. Garden* 24: 265-498.

1. Leaves simple
   2. Blades broadly elliptic, olive-green, flat with glandular hairs beneath; petioles to 1 cm long ..... ***R. kearneyi***
   2' Blades ovate (sometimes broadly so), bright green, often conduplicate, glabrous; petioles more than 1 cm long ..... ***R. ovata***
1' Leaves compound
   3. Rachis winged; leaflets hirsute, 6-9 mm long; branches stiff and spinescent ..... ***R. microphylla***
   3' Rachis not winged; leaflets glabrous to puberulent, 15-80 mm long; branches flexible and not spinescent ..... 4

Vascular Plants of Arizona: Anacardiaceae. *CANOTIA* 3 (2): 13-22, 2007. ©2007 John L. Anderson.

4. Leaves pinnately compound
5. Leaves 5-9 foliolate ..... ***R. virens***
5' Leaves 13-19 foliolate ..... ***R. glabra***
4' Leaves usually trifoliolate
6. Leaflets ovate to rhombic, crenate to deeply lobed ..... ***R. aromatica***
6' Leaflets narrowly lanceolate, entire to slightly serrate ..... ***R. lancea***

**Rhus aromatica** Aiton (aromatic, referring to the leaves). Skunkbush, Three-leaf Sumac, Lemonade Sumac. —Shrubs with spreading branches, sometimes forming thickets, to 3 m tall; bark gray, lenticular; twigs brown, puberulent to glabrate. LEAVES trifoliolate or palmately lobed to simple and unlobed; petioles 8-15 mm long; leaflets sessile, ovate to rhombic, crenate to deeply lobed, glabrous to puberulent; bases cuneate, sometimes narrowly so; terminal leaflet 15-35 mm long, 7-25 mm wide; foliage thin, deciduous and dark red in the fall. INFLORESCENCES a short dense panicle of compound spikes, arising from lateral branches, and appearing early before the leaves in the spring, 10-15 mm long; bracts triangular, reddish, pubescent. FLOWERS to 3 mm long; sepals ovate, pinkish, glabrate; petals obovate, pale yellow, glabrous. FRUIT lenticular-orbicular, 6-8 mm in diameter, dull orange to dark reddish, villous and/or short glandular pubescent, viscid. [*Rhus trilobata* Nutt.]. —Throughout the U.S., except the northern Great Lakes and Pacific Northwest, also s Canada and n Mex.

Var. **trilobata** (Nutt.) A. Gray (three lobes, referring to the leaves). —Plants ill-scented. FRUITS sparsely pubescent. [*Rhus trilobata* Nutt.]. —Wide-ranging both ecologically and geographically from rim rock, rocky ledges and slopes to canyon bottoms in the deserts, grasslands, chaparral, Madrean woodlands, pinyon-juniper woodlands, ponderosa pine forests, and riparian zones: all AZ cos.; 500-2275 m (1500-7500 ft); Mar-May; w U.S. Material from the w U.S. including AZ has been recognized as *Rhus aromatica* Aiton var. *trilobata* (Nutt.) A. Gray, differing in its sparsely pubescent fruits from typical *R. aromatica* of the e U.S. with villous fruits (Fernald 1941); also, *R. aromatica* var. *trilobata* is ill-scented whereas *R. aromatica* of the e U.S. has a pleasant citrus scent (David Hammond pers. comm.). Several other varieties of *Rhus aromatica* have been named (based on characters such as leaf size, lobing, and pubescence, and time of flowering) that would occur in AZ (Barkley 1937). Since there are no consistent geographic patterns to the variation in these characters, *Rhus aromatica* are best treated as a polymorphic species consisting of only the two varieties (e U.S. and w U.S.).

**Rhus glabra** L. (smooth, referring to the leaves). Smooth Sumac, Scarlet Sumac. —Thicket-forming shrubs or small trees, to 3 m tall; bark dark gray; twigs glaucous, lenticular, pinkish-gray. LEAVES odd-pinnately compound, 13-19 foliolate; leaflets sessile, narrowly lanceolate to oblong, 20-80 mm long, 10-25 mm wide, subentire to serrate, glabrous, dark green above, paler beneath, deciduous and bright red in the fall; apex acuminate; base rounded. INFLORESCENCES dense thryses, 16-24 cm long, 8-24 cm wide, puberulent; bracts narrowly lanceolate, caducous FLOWERS to 3 mm long; sepals greenish; petals cream. FRUIT lenticular-orbicular, to 4 mm in diameter, dark red, glandular pubescent, viscid. —Rich soil in oak and ponderosa pine woodlands, often in canyons and riparian zones: all AZ cos. except La Paz, Santa Cruz, and Yuma; 1030-1820 m (3400-6000 ft); Jun-

Aug (fruits may persist overwinter); s Canada, WA, OR to New England, s to FL, TX, AZ, n Mex.

**Rhus kearneyi** Barkley (for T. H. Kearney). Kearney Sumac, Tinajas Altas Sumac. —Densely branched shrubs or small trees, to 3.5 m tall; old bark dark, scaly; branches tan to gray, densely puberulent to glabrate later. LEAVES simple, entire to serrulate, broadly elliptic, 2-6 cm long, 1.5-3.7 cm wide, leathery, olive-green, with glandular hairs beneath, glabrous to sparsely hirtellous above; tip rounded to acuminate; base rounded to cordate; petioles 3-10 mm long. INFLORESCENCES dense panicles, 2-4.5 cm long, puberulent; bracts lanceolate to ovate, glandular-puberulent, to 3 mm long. FLOWERS to 5 mm long; sepals pinkish, puberulent; petals cream, glabrous. FRUIT lenticular-orbicular, irregular in outline, 10 mm long, 8 mm wide, mottled brown and yellow, glandular-pubescent, viscid. [*Schmaltzia kearneyi* Barkl.]. —3 subsp.; sw AZ, Baja CA.

Subsp. **kearneyi** —Leaves entire, with short glandular hairs beneath (appearing as black spots in dried specimens), glabrous above; tip rounded. FLOWERS to 3 mm long. —North- and east- facing, steep, canyons, rocky slopes, and washes in Sonoran Desert mountain ranges: Yuma co.; 300-460 m (1000-1500 ft); Feb-Mar; sw AZ and one known record from Baja CA. A relict, possibly most closely related to *Rhus integrifolia* (Nutt.) Brewer & S. Wats. of coastal California (Moran 1969), known only from the Tinajas Altas, Gila, and Cabeza Prieta Mts. in AZ and the San Pedro Martir Mts. in Baja CA. The two other subspp., *R. kearneyi* subsp. *borjaensis* Moran and *R. kearneyi* subsp. *virginum* Moran, occur in Baja CA (Moran 1969).

**Rhus lancea** L. f. (lance-shaped, referring to the leaves). African sumac. —Trees or shrubs, to 10 m tall; old bark dark gray, fissured and orange beneath; twigs reddish. LEAVES evergreen, trifoliate; petioles 25-30 mm long; leaflets subsessile, narrowly lancelolate, entire to slightly serrate, 4-10 cm long, 0.5-1.0 cm wide, entire, leathery, dark shiny green above, pale-green beneath, glabrous; apex acuminate; base narrowly cuneate. INFLORESCENCES open panicles, 2-9 cm long, terminal and axillary; bracts linear-subulate. FLOWERS to 3 mm long; sepals ovate, glabrous; petals oblong-ovate, greenish yellow, glabrous. FRUIT globose, to 5 mm in diameter, tan, resinous, wrinkled. [*Searsia lancea* (L. f.) Barkl.]. —Cultivated as an ornamental in the Sonoran Desert, escaping and naturalized ("its naturalization may be expected", Lundell 1961) in canyons in the Rincon and Tucson Mts. in Pima County (Philip Jenkins pers. comm.), native to southwestern Africa (Lundell 1961). The southern African sumacs have been treated as the segregate genus *Searsia* Barkley (Barkley 1942). *Rhus lancea* is here treated within *Rhus sensu latu* as it is beyond the scope of this new Arizona Flora project to evaluate its generic placement.

**Rhus microphylla** Engelm. (little leaves). Little-leaf (desert) sumac. —Densely branched shrub, to 2 m tall; old bark dark gray, lenticular; branches gray, stiff and spinescent, puberulent to glabrate. LEAVES 12-20 mm long, deciduous, odd-pinnately compound, 5-9 foliolate, with a winged rachis; leaflets sessile, elliptic, 6-9 mm long, 2-5 mm wide, entire, hirsute. INFLORESCENCES small, dense spikes, terminal and axillary, 8-12 mm long; bracts ovate, pubescent, to 2 mm long;

flowers appearing early before or with the first leaves. FLOWERS to 3 mm long; sepals dark pink, glabrous; petals cream, glabrous. FRUIT ovoid, 5-7 mm in diameter, dark red to orange, glandular hairy, wrinkled in dried specimens. [*Schmaltzia microphylla* (Engelm.) Small]. —Gravelly mesas and rocky hillsides, often on limestone, in Chihuahuan Desert, semi-desert grassland, and oak (encinal) woodland, occasionally along dry washes and in mesquite bosques and riparian woodlands: Cochise, Graham, Greenlee, Pima, and Santa Cruz cos.; 1250-1715 m (3800-5200 ft); Mar-May; w TX and Mex to NM, AZ. In southeastern AZ, *Rhus microphylla* reaches the northwestern edge of its range.

**Rhus ovata** S. Wats. (egg-shaped, referring to the leaves). Sugar Sumac, Sugar Bush, Mountain-laurel. —Evergreen shrubs or small trees, to 5 m tall, densely leaved; old bark shaggy; twigs reddish, puberulent then glabrate. LEAVES simple, entire, repand, ovate (sometimes broadly so), 4-8.5 cm long, 3-5 cm wide, leathery, bright green, glabrous, conduplicate (tending to fold along the midrib, especially in dried specimens); tip acuminate; base rounded-truncate; petioles 10-20 mm long. INFLORESCENCES dense panicles, 2.5-3.5 cm long, glabrous; bracts ovate, sparsely pubescent, to 2 mm long. FLOWERS to 5 mm long; sepals magenta, ciliate; petals cream to pinkish, ciliate. FRUIT lenticular-orbicular, 5-7 mm in diameter, dark reddish, glandular-pubescent, viscid. [*Schmaltzia ovata* (S. Wats.) Barkl.]. —Open, rocky hillsides with interior chaparral and at upper edge of Sonoran Desert, sometimes along washes: Coconino, Gila, Graham, Maricopa, Mohave, Pinal, and Yavapai cos.; 550-1900 m (1800-6200 ft); Mar-May; s CA and Baja CA to AZ. The populations of *Rhus ovata* in AZ are disjunct from the Transverse and Peninsular Ranges of southern California. Its broad, shiny, evergreen leaves make *Rhus ovata* conspicuous on chaparral and desert hillsides.

**Rhus virens** Lindh. ex A. Gray (green, referring to the leaves). Evergreen Sumac, Tobacco Sumac. —Sparsely branched shrubs or small trees, to 3 m tall; bark gray, lenticular; twigs gray, puberulent to glabrate. LEAVES evergreen, petiolate, odd-pinnately compound, 5-9 foliolate; petiole to 2 cm long; leaflets petiolulate to subsessile, lanceolate or elliptic to ovate, 25-50 mm long, 10-25 mm wide, entire, leathery, dull green above, paler and puberulent to glabrate beneath; apices acute to acuminate; bases cuneate to rounded (sometimes obliquely). INFLORESCENCES open panicles, to 8 cm long and 15 cm wide, terminal and axillary, puberulent; bracts lanceolate, pubescent, to 2 mm long. FLOWERS to 5 mm long; sepals ovate, olive-green, glandular puberulent; petals cream, glabrous. FRUIT lenticular-orbicular, to 6 mm in diameter, orange, glandular pubescent, wrinkled in dried specimens. [*Rhus sempervirens* Scheele; *Schmaltzia virens* (Lindh.) Small; *Rhus choriophylla* Wooton & Standley; *Rhus virens* var. *choriophylla* (Wooton & Standley) L. D. Benson; *Rhus virens* subsp. *choriophylla* (Wooton & Standley) Young]. —Dry, often rocky hillsides, steep slopes, and canyons, upper edge of the Chihuahuan Desert to semi-desert grassland, chaparral, oak woodland, and as understory along washes and riparian zones: Cochise, Pima, and Santa Cruz cos.; 1100-1870 m (3600-6000 ft); Aug-Sept (fruits may persist overwinter); se AZ, s NM, w TX and n Mex. AZ material has been called *Rhus choriophylla* Wooton & Standley (Type: Guadalupe Canyon, on the Mexican boundary, near the southwest corner of New Mexico,

*Mearns 699*, US) based on fewer, larger, and glabrous leaflets and axillary as well as terminal inflorescences (Wooton and Standley 1913; Barkley 1937); but, it has been considered a weak variety (Vines 1960; Shreve and Wiggins 1964; Correll and Johnston 1970). These morphological characters are not consistently present in AZ specimens; therefore, AZ material is best treated as the far w portion of the range of *Rhus virens* Lindh. and not a separate taxon.

**Toxicodendron** Miller Poison-ivy

Dioecious shrubs with rhizomes to 1.5 m tall, or vines climbing with aerial roots to 30 m tall. LEAVES trifoliolate; leaflets ovate, entire to serrate, terminal leaflets with a petiolule, the lateral leaflets subsessile. INFLORESCENCES narrow panicles, pendant in fruit. FLOWERS small, regular, five-merous; sepals connate at base, glabrous; petals cream to yellowish with dark veins; style three-lobed. FRUIT cream-colored, striate and glabrous. —Ca. 15 spp; New World and e Asia. (Latin: poisonous tree). Gillis, W. T. 1971. *Rhodora* 72-237, 370-443. The ever present active poisonous compounds in the resin on the leaves, stems and fruits are catechols that cause dermatitis.

**Toxicodendron radicans** (L.) Kuntz (with aerial roots). Poison-ivy. —Vines climbing with aerial roots to 30 m or sparsely branched rhizomatous shrubs, to 1.5 m tall; branches puberulent to glabrous. LEAVES trifoliolate (rarely 5 foliolate); petioles puberulent to glabrous, 2-17 cm long; terminal leaflets with a petiolule to 3 cm long; lateral leaflets subsessile; leaflets narrowly to broadly ovate, 2-7 cm wide, 3-13 cm long entire or notched to crenate or serrate; bases rounded; apices acuminate. INFLORESCENCES a short, narrow panicle to 5 cm long, bracts lanceolate, deciduous. FLOWERS to 3 mm long; sepals deltoid, greenish, glabrate; petals oblanceolate, cream to yellowish with dark veins. FRUIT globose, to 5 mm in diameter, cream, striate, glabrous. [*Rhus radicans* L]. —10 vars., 2 in AZ their ranges meeting in se AZ where intermediates occur.

1. Plants vines with aerial roots or shrubs; petioles puberulent, shorter than the terminal leaflet; leaflets narrowly ovate, 2-3 times as long as wide; margin entire to notched ..... var. ***divaricatum***
1' Plants always subshrubs to shrubs, rhizomatous; petioles glabrous, usually much longer than the terminal leaflet; leaflets broadly ovate, 1-1.5 times as long as wide; margins crenate to serrate ..... var. ***rydbergii***

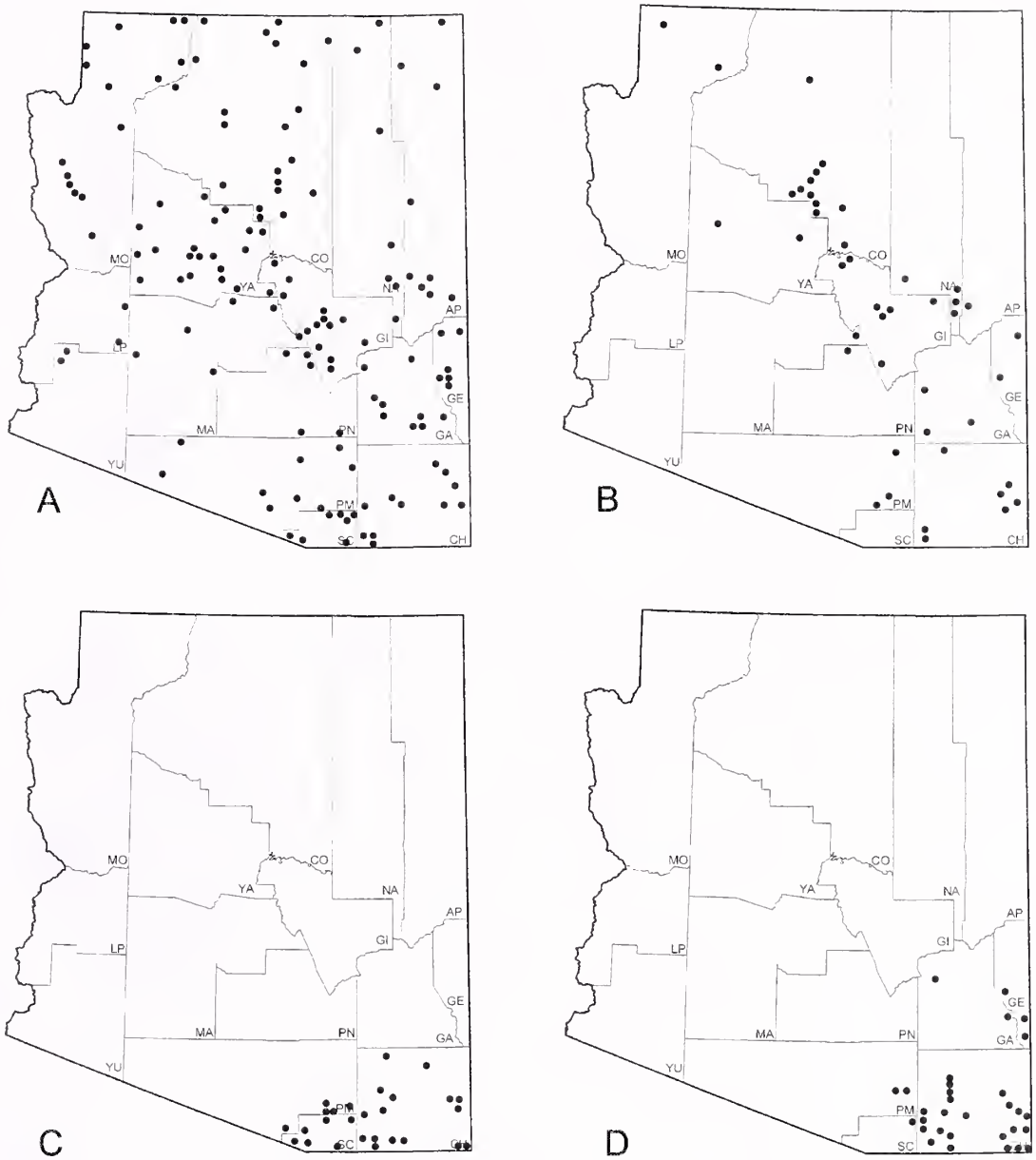
Var. **divaricatum** (E. Greene) Barkley (spreading at a wide angle). —Vines climbing with aerial roots or shrubs. LEAVES with puberulent petioles, shorter than the terminal leaflet; leaflets narrowly obovate, 2-3 times as long as wide; margins entire to notched. [*Toxicodendron divaricatum* E. Greene; *Rhus radicans* var. *divaricata* (Greene) Fernald]. —Canyon bottoms and adjacent slopes in riparian zones and Madrean woodlands; Cochise, Pima, and Santa Cruz cos.; 1390-1820 m (4600-6000 ft); May-Aug; se AZ and w Mex.

Var. **rydbergii** (Small ex Rydberg) D. S. Erskine (for P. A. Rydberg). —Subshrubs or shrubs spreading and rhizomatous, to 3 m tall. LEAVES with glabrous petioles much longer than terminal leaflet, to 17 cm long; leaflets broadly

obovate, 1-1.5 times as long as broad; margins crenate to serrate, $2n = 30$. [*Toxicodendron rydbergii* (Small ex Rydberg) E. Greene; *Rhus rydbergii* Small ex Rydberg]. —Moist but often sunny sites along canyons and at seeps and springs, from the Sonoran Desert to mixed conifer forest; all AZ cos. except Pima, Pinal, Santa Cruz, and Yuma; 455-2575 m (1500-8500 ft); Apr-Jun; across s Canada and n US (e of the Cascades), s through Rocky Mountains and Great Plains to AZ, NM, and w TX.

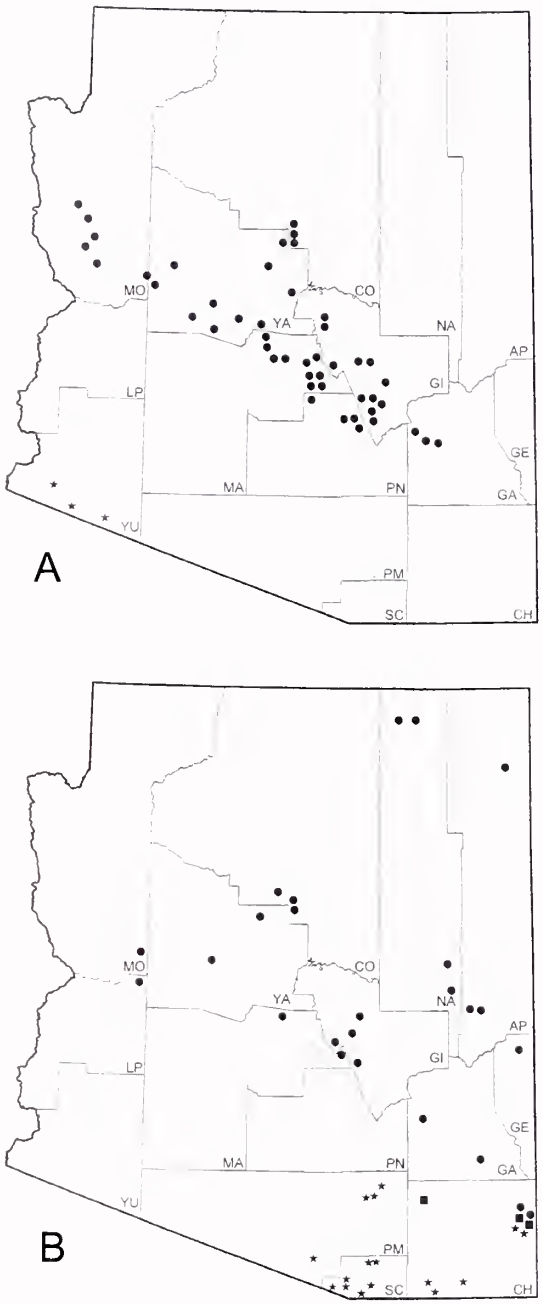
## ACKNOWLEDGMENTS

I thank the curators and staff of ARIZ, ASC, ASU, and DES for kindly allowing me to study their specimens. At ASU I am grateful to Drs. Pinkava and Landrum for their guidance and to Andrew Salywon, Raul Puente and Shannon Doan for their assistance.




**Anacardiaceae** Figure 1. Distributions of: (A) *Rhus aromatica* var. *trilobata*; (B) *Rhus glabra*; (C) *Rhus virens*; (D) *Rhus microphylla*.

.




**Anacardiaceae** Figure 2. Distributions of: (A) *Rhus ovata* (circles), *Rhus kearneyi* subsp. *kearneyi* (stars); (B) *Toxicodendron radicans* var. *rydbergii* (circles), *Toxicodendron radicans* var. *divaricatum* (stars), *Toxicodendron radicans* var. *divaricatum* X *rydbergii* (squares).

**Anacardiaceae** Figure 3. (A) *Rhus aromatica* var. *trilobata*, habit 1/2x, fruit 8x; (B) *Rhus glabra*, habit 1/2x, flower 8x; (C) *Rhus kearneyi* subsp. *kearneyi*, habit 0.8x, fruit 1.2x, flower 3x; (D) *Toxicodendron radicans* var. *rydbergii*, stem with fruits 1/2x, flower 5x. (*A, B & D, reproduced with permission from Flora of the Pacific Northwest, 1973, University of Washington Press, drawn by Jeanne Janish; C, reproduced with permission from Arizona Rare Plant Field Guide, 2001, drawn by Wendy Hodgson*).

## LITERATURE CITED

CORRELL, D.S. and M.C. JOHNSTON. 1970. *Manual of the Vascular Plants of Texas*. Texas Research Foundation, Renner.

BARKLEY, F.A. 1937. A monograph study of *Rhus* and its immediate allies in North and Central America, including the West Indies. *Annals of the Missouri Botanical Garden* 24: 265-498.

BARKLEY, F.A. 1942. A key to the genera of Anacardiaceae. *American Midland Naturalist* 28: 465-474.

FERNALD, M.L. 1941. Another century of additions to the flora of Virginia. *Rhodora* 43: 599-603 (Plates 686 and 687).

LUNDELL, C.L. 1961. *Flora of Texas*: Vol. III. Texas Research Foundation, Renner.

MORAN, R. 1969. Twelve new dicots from Baja California, Mexico. *Transactions of the San Diego Society of Natural History* 15: 271-275.

SHREVE, F. and I.L. WIGGINS. 1964. *Vegetation and Flora of the Sonoran Desert*: Vol. II. Stanford University Press, Stanford.

VINES, R.A. 1960. *Trees, Shrubs and Woody Vines of the Southwest*. University of Texas Press, Austin.

WOOTON, E.O. and P.C. STANDLEY. 1913. Descriptions of new plants preliminary to a report upon the flora of New Mexico. *Contributions from the U.S. National Herbarium* 16: 109-196.

# BROMELIACEAE BROMELIAD OR PINEAPPLE FAMILY

Raul Gutierrez, Jr.

School of Life Sciences
Arizona State University
P. O. Box 874601
Tempe, AZ 85282-4601

Plants perennial, herbaceous, and terrestrial, epipetric, or epiphytic. ROOTS usually present, poorly developed and serving more as holdfasts in epiphytic species. STEMS short and compressed to very elongate. LEAVES spirally arranged or distichous, simple and with a dilated sheath, usually covered with peltate, water-holding trichomes; margins entire to serrate (sometimes spinose). INFLORESCENCES spicate, racemose, or paniculate; bracts usually present and conspicuous. FLOWERS perfect or with staminate and pistillate flowers on different plants, symmetry radial to bilateral; perianth of 6 parts, often in 2 distinct sets of 3; stamens 6, in 2 series of 3; ovary inferior or superior; placentae axile. FRUITS capsules or berries. SEEDS naked, winged, or plumose. —ca. 60 genera, ca. 2600 spp. Tropical and subtropical areas in the New World, with one genus represented in w Afr. The pineapple, *Ananas comosus* (L.) Merrill, is in cultivation worldwide in tropical areas.

## **Tillandsia** L.

Plants epiphytic, herbaceous, and perennial. ROOTS lacking or poorly developed. STEMS short to elongate. LEAVES rosulate or distichous, entire, linear to triangular or ligulate, conspicuously covered by trichomes. INFLORESCENCE a distichous spike, sometimes reduced to a single polystichous spike or even single-flowered; floral bracts broad and conspicuous. FLOWERS perfect; sepals symmetric, distinct or posterior pair united; petals free and glabrous; ovary superior and glabrous; ovules many. FRUITS septicidal capsules. SEEDS narrowly cylindric with basal, white, plumose appendage. —ca. 550 species; Neotropics. (Named after the Swedish botanist E. Tillands, 1640-1693.)

**Tillandsia recurvata** (L.) L. (recurved or curved backwards). Ball-moss. —Plants typically in dense ball-like clumps to 15 cm diameter. STEMS compressed. LEAVES grayish-green, in 2 ranks, recurved, densely covered with peltate trichomes; leaf bases sheath-like, not inflated or forming pseudobulbs; blades subulate medially to terete distally; apex acute to attenuate. INFLORESCENCES scapose, erect and conspicuously held above the leaves; floral bracts imbricate and covering the rachis at anthesis. FLOWERS 1 or 2; sepals free and glabrous, lanceolate with an acute apex; petals united, violet; stamens included; stigma 1, included and erect. FRUITS to 2 cm long. SEEDS many, to 1 mm long, with numerous thread-like hairs to 2 cm long. [*Renealmia recurvata* L., *Diaphoranthema recurvata* (L.) Beer]. —Growing on trees

Vascular Plants of Arizona: Bromeliaceae. *CANOTIA* 3 (2): 23-25, 2007. ©2007 Raul Gutierrez Jr.

and shrubs: Cochise, Graham, Pima, Santa Cruz cos.; below 1500 m; May-Sep; FL, GA, LA, TX; Mex. to S. Amer. and W. Ind.

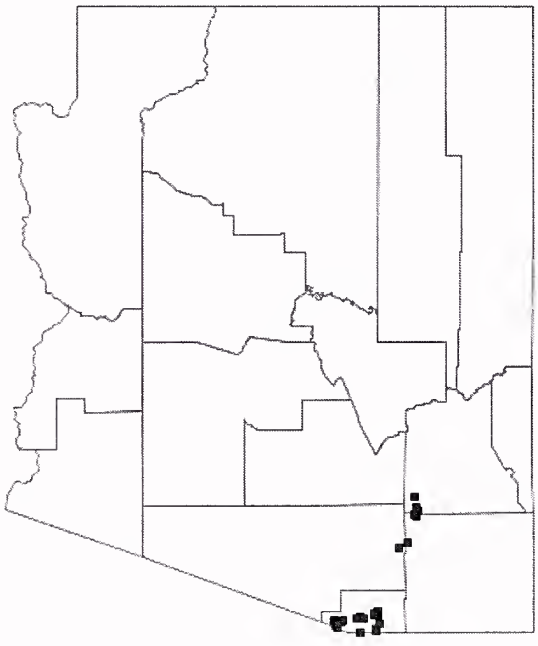
**ACKNOWLEDGMENTS**

I thank E. Gilbert and P.D. Jenkins (ARIZ), S. Doan, L.R. Landrum, and E. Makings (ASU), and D.Z. Damrel and W.C. Hodgson (DES) for making specimens available for study. I would also like to acknowledge the anonymous reviewers whose comments have helped to improve the quality of this publication.

## LITERATURE CITED

LUTHER, H.E. and G.K. BROWN. 2000. Bromeliaceae. *In:* Flora of North America Editorial Committee (eds.). *Flora of North America* 22: 286-298. Oxford University Press, New York.

CORRELL, D.S. and M.C. JOHNSTON. 1970. *Manual of the Vascular Plants of Texas.* Texas Research Foundation, Renner.



**Bromeliaceae** Figure 1. Distribution of: *Tillandsia recurvata.*

**Bromeliaceae** Figure 2. *Tillandsia recurvata*, entire plant.

# MARTYNIACEAE UNICORN-PLANT FAMILY

Raul Gutierrez, Jr.

School of Life Sciences
Arizona State University
P. O. Box 874601
Tempe, AZ 85282-4601

Herbs, viscid-pubescent, annual or perennial, usually strongly scented. LEAVES simple, opposite or subopposite, exstipulate, long-petioled, entire to sinuate, dentate, or lobed, cordate at base. INFLORESCENCE a terminal raceme. FLOWERS showy, perfect, zygomorphic; calyx bibracteolate, composed of 5 irregular sepals that are fused and split abaxially to base; corolla sympetalous, 5-lobed and bilabiate, the tube cylindrical at base and equaling or surpassing the calyx, the throat campanulate or infundibular, the upper lobes exterior in bud; stamens 4, didynamous, or 2, the second pair staminodial; filaments attached to the corolla; anthers with two divergent cells; ovary superior and inserted on an annular glandular disk, unilocular, bicarpellate with 2 parietal placentae expanded into 2 broad T-shaped lamellae cohering above into false partitions; style 1; stigma with 2 flat and sensitive lobes; ovules few to many. FRUIT a drupaceous capsule, bivalved and dehiscing longitudinally, imperfectly 5-celled, frequently crested and always terminated by an incurved 2-horned beak; exocarp thick, fleshy, deciduous in 2 valves; endocarp woody and persistent (can be found at any time of the year), sculptured, crested along the adaxial (and sometimes abaxial) suture. SEEDS 4 to many, often somewhat irregularly compressed, the testa corky-tuberculate in ours.
—5 genera, 13 spp. Native to the U. S., Mex., W. Ind., C. and S. Amer., naturalized in other parts of the world.

**Proboscidea** Keller Unicorn-Plant, Devil's Claw

Erect to decumbent herbs arising from annual taproots or perennial tuberous roots. LEAVES orbicular-reniform to ovate-lanceolate, sometimes inequilateral at base with margins entire or palmately or pinnately lobed. INFLORESCENCES usually exceeding the leaves, few- to many-flowered, the axis lengthening in fruit. FLOWERS 2-7 cm in length; pedicels erect to spreading but lengthening, thickening and becoming deflexed in fruit; calyx up to 2.5 cm long, spathaceous and more or less unequally 5-lobed, split abaxially to the base, deciduous, with 2 frequently fleshy-thickened linear to orbicular bracts at the base; corolla sympetalous, somewhat bilabiate, tubular-cylindric to campanulate or infundibular, more or less gibbous and ventricose, the limb 5-lobed, the lobes rounded; stamens 4, didynamous, the rudiment of a 5$^{th}$ usually obvious, included in throat of corolla, the abaxial pair of fertile stamens longer; filaments arcuate; anthers gland-tipped with spreading cells; pistils about as long to longer than stamens; style slender, about three times as long as ovary; stigma lobes 2, sensitive, obovate-oblanceolate, included in or slightly exserted from the throat; ovary 1-celled, ovate to lanceolate and usually glabrous.

Vascular Plants of Arizona: Martyniaceae. *CANOTIA* 3 (2): 26-31, 2007. ©2007 Raul Gutierrez Jr.

FRUIT: exocarp viscid-tomentose, deciduous; endocarp woody, reticulate-sculptured, with a suture on both dorsal and ventral median lines, crested along the dorsal suture and occasionally on the ventral suture, terminated by an upcurved beak about 1.25 to 3.5 times as long as the body that splits into two elongate, sharp-pointed rostrum. SEEDS black or white, 6-8 mm long, angled, with a thick corky tuberculate testa. — 6 species; U.S., Mexico, Guatemala, Peru; may be naturalized as a weed worldwide. (Name from Greek, *proboskis, pro-* forward or in front of *+boskein* to feed, in allusion to the long-beaked fruit and its resemblance to elephants and their relatives.)

1. Plant perennial, arising from a tuberous root; corolla light-yellow to bronze; fruit crested on dorsal side only or on both dorsal and ventral sides; lamina of leaf usually wider than long ..... ***P. althaeifolia***
1' Plant annual, arising from a taproot; corolla reddish-purple, pink or rarely white; fruit crested on dorsal side only; lamina of leaf usually longer than wide ..... ***P. parviflora***

**Proboscidea althaeifolia** (Bentham) Decaisne (healing-leaved, in reference to the use of the sticky leaves for removing lice). Desert Unicorn-Plant. —Decumbent and spreading perennial to 2 dm high. ROOTS large and fusiform. LEAVES simple; petioles 3-18 cm long; blades nearly reniform or suborbicular to broadly ovate, 2-7 cm long, 2-8 cm wide, the margins entire to deeply lobed. INFLORESCENCES short racemes with an initial axis length of 5-12 cm but lengthening in fruit to 1-2 dm. FLOWERS 3-16 and fragrant; pedicels 2-8 cm long, slender, ascending in anthesis and with a linear basal bract; calyx bracts orbicular or broadly ovate to oblong-falcate, 5-10 mm long, 2-5 mm wide; calyx 1-1.5 cm long, the lobes cut one third to one half its length, viscid-pubescent without, glabrous within, the margins glandular-ciliate; corolla yellowish-brown externally, yellow to bronze-orange internally, the tube with pale blotches and maroon, reddish-brown or rust-colored spots in two rows internally and leading out to the throat and lobes, 2-3 cm long, slightly to strongly ventricose, infundibular to campanulate, the lobes spreading; filaments viscid-pubescent at their base; pistil as long as or longer than the stamens. FRUIT body very slender, 5-6 cm long and ca. 12 mm thick, crested dorsally and sometimes ventrally, the horns about twice as long as the body, the distal tooth on the dorsal suture often forming a slender horn. [*Martynia altheaifolia* Bentham, *M. arenaria* Engelmann, *M. palmeri* S. Watson, *Proboscidea arenaria* (Engelmann) Decaisne, *P. confusa* Van Eseltine, *P. peruviana* Van Eseltine]. —In sandy soil and on dunes and gravelly hills: Cochise, Gila, Graham, Maricopa, Mohave, Pima, Pinal, Santa Cruz, Yavapai, Yuma cos.; below 1200 m (4000 feet); May-Sept; CA, NM, TX; n Mex., Peru.

**Proboscidea parviflora** (Wooten) Wooten & Standley (small flowers). —Erect or spreading annual to 2.5 m across and 1 m high. LEAVES simple; petioles to 25 cm long or more; blades broadly triangular-ovate to subobicular-ovate, cordate or inequilateral, rounded to obtuse at apex, to 25 cm long and nearly as broad, the margins entire to shallowly 3- to 7-lobed, the sinuses obtuse, denticulate. INFLORESCENCES slender racemes to 2.5 dm long at maturity. FLOWERS 5-15 per inflorescence; pedicels 1.5-3 cm long in anthesis, lengthening in fruit to about 45 mm; pedicel bract obovate to oblanceolate, 3-5 mm long; calyx bracts ovate to elliptic

3-5 mm wide; calyx 1-1.5 cm long, the lobes unequally cut one fourth to one half its length; corolla tubular-campanulate, only slightly ventricose, 2.5-4 cm long, viscid-glandular without and slightly so within; corolla tube reddish-purple, pink, or white, with a bright yellow band extending along the lower portion of tube and out onto lower lobe; corolla lobes the same color as the tube but the upper lobes frequently with a single large purple or reddish-purple blotch, the upper and lateral lobes wide-flaring or reflexed; filaments glandular at or below point of attachment, glabrous above; anthers 2.8-5.0 mm long; pistil as long as or longer than the stamens. FRUIT body ellipsoid, 5-10 cm long, 1.5-3 cm thick and strongly keeled ventrally, the horns about 1 to 3.5 times as long as the body. —3 subsp., 1 in AZ; CA, NV, NM, TX; n Mex.

Subsp. **parviflora.** —INFLORESCENCES slender racemes to 1.5 dm long often covered over by the leaves. FLOWERS 10 or fewer; pedicels 1.5-3 cm long in anthesis, lengthening in fruit to about 4.5 cm; abaxial corolla lobe narrower than 16 mm; anthers shorter than 4.2 mm. —2 varieties, both in AZ; CA, NV, NM, TX; n Mex.

1. Rostrum on fruit longer than 18 cm; seeds white ..... var. ***hohokamiana***
1' Rostrum on fruit shorter than 18 cm; seeds black ..... var. ***parviflora***

Var. **hohokamiana** Bretting. —FLOWERS with anthers longer than 2.8 mm; style longer than 15 mm. FRUIT body longer than 9 cm, fruit crests longer than 5 cm and higher than 5 mm; rostrum longer than 18 cm. SEEDS white.
—Cultivated as a field crop for basketry fiber: Coconino, Gila, Maricopa, Pima, Pinal cos., below 1200 m (4000 ft); May–Sep; CA, NV, UT.

Var. **parviflora.** —FLOWERS with anthers shorter than 2.8 mm; style shorter than 10 mm. FRUIT body shorter than 9 cm, fruit crests shorter than 5 cm and lower than 5 mm; rostrum shorter than 18 cm. SEEDS black. [*Martynia parviflora* Wooton, *Proboscidea crassibracteata* Correll]. —In disturbed areas: All cos. except La Paz and Navajo; below 1200 m (4000 ft); May-Sep; CA, NM, TX; n Mex.

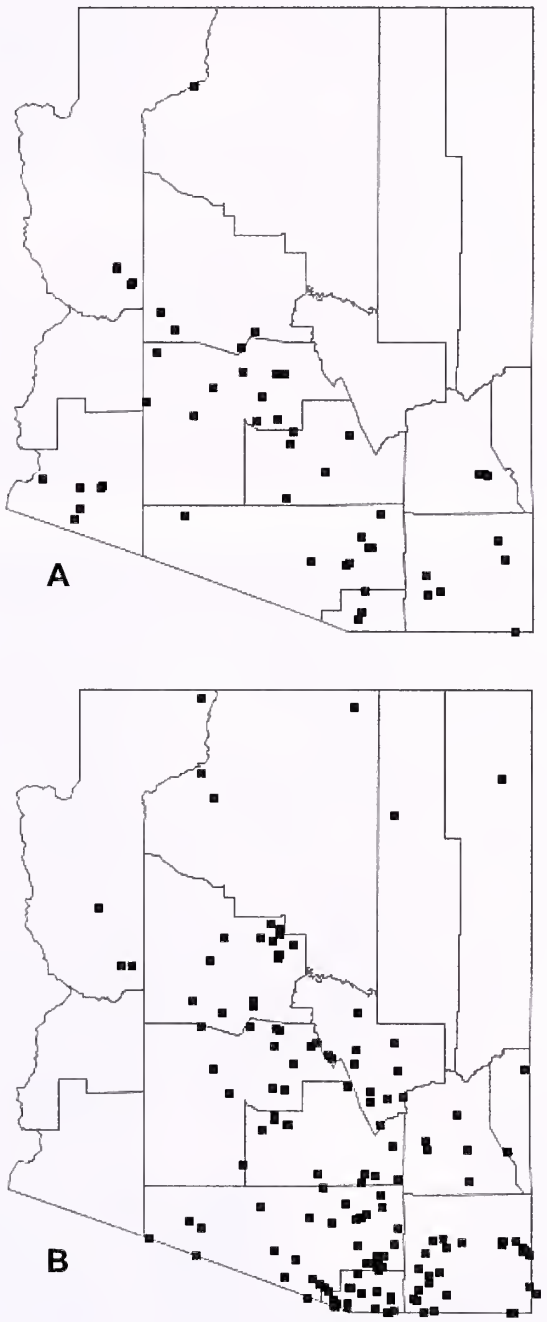
## ACKNOWLEDGMENTS

I thank the curators and staff at ARIZ, ASU, and DES for making specimens available for study. The *Proboscidea* flower images were generously provided by E. Makings. I would also like to acknowledge the anonymous reviewers whose comments have helped to improve the quality of this publication.

## LITERATURE CITED

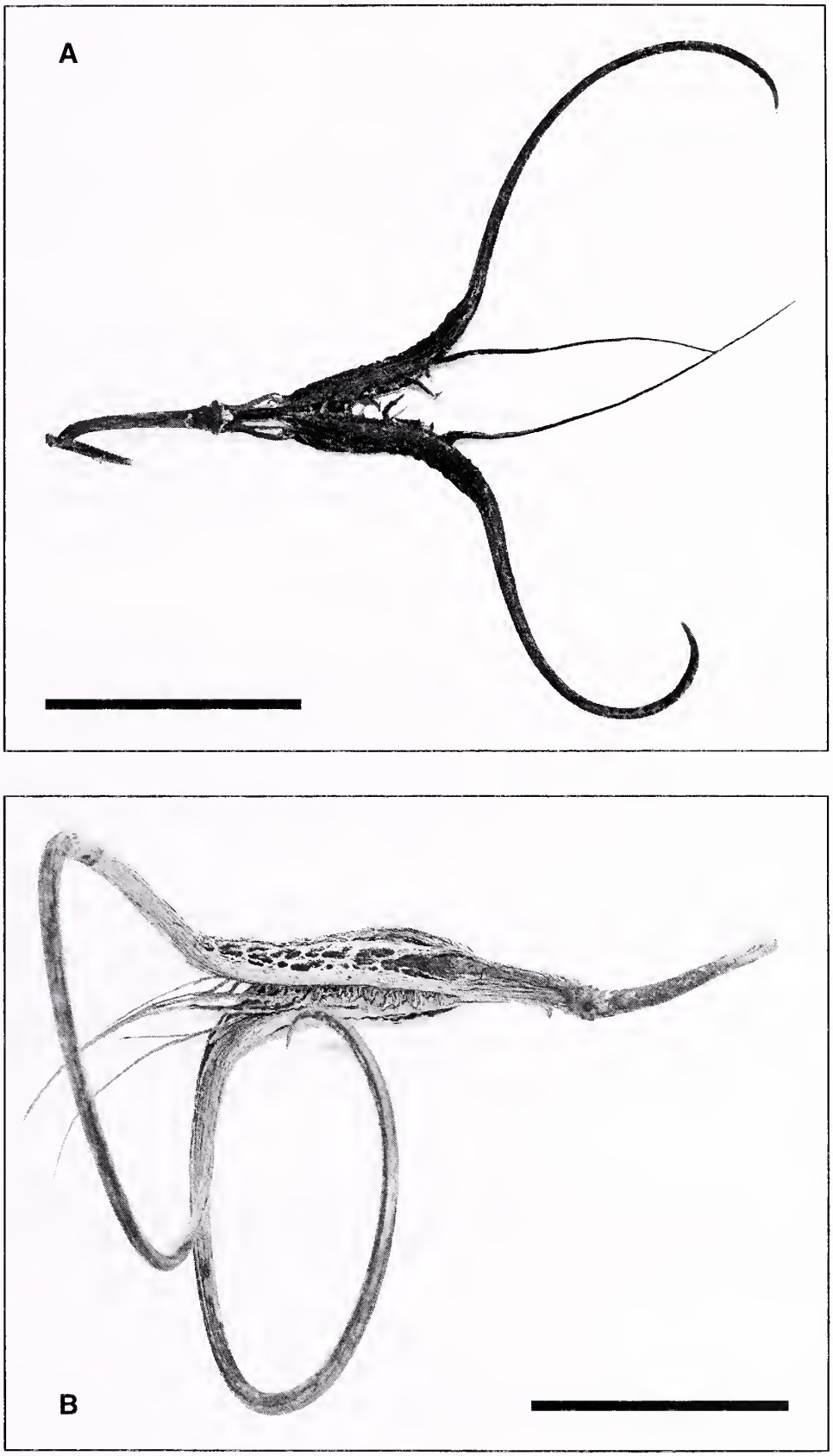
CORRELL, D.S. and M.C. JOHNSTON. 1970. *Manual of the Vascular Plants of Texas*. Texas Research Foundation, Renner.

KEARNEY, T.H. and R.H. PEEBLES. 1960. *Arizona Flora*. 2nd edn. University of California Press, Berkeley.




**Martynicaceae** Figure 1. Distributions of: (A) *Proboscidea althaeifolia*; (B) *P. parviflora*.

**Martynicaceae** Figure 2. *Proboscidea*: (A) *P. althaeifolia*, flower; (B) *P. parviflora*, flower (*images courtesy of Elizabeth Makings*).




**Martynicaceae** Figure 3. *Proboscidea* fruits: (A) *P. althaeifolia* (*Pinkava* et al. 6333); (B) *P. parviflora* subsp. *parviflora* var. *parviflora* (*E. Joyal 1965*; all scale bars = 5 cm).

# PSILOTACEAE WHISK-FERN FAMILY

Raul Gutierrez, Jr.

School of Life Sciences
Arizona State University
P. O. Box 874601
Tempe, AZ 85282-4601

Plants perennial, terrestrial, epipetric, or epiphytic. ROOTS lacking. STEMS green, simple or dichotomously branching. LEAVES absent or ligulate, less than 1.5 cm long, alternate to subopposite, veinless or with one vein. SYNANGIA, a structure composed of three fused homosporous sporangia, solitary and sessile. SPORES numerous and reniform. GAMETOPHYTES subterranean, elongate, and branched. —2 genera, 12 spp. Tropical and subtropical areas worldwide, though absent from dry areas.

## **Psilotum** Swartz Whisk-fern

Plants perennial, epiphytic, or rarely terrestrial. RHIZOMES short and creeping in habit, lacking roots but with short hair-like rhizoids. STEMS green, unbranched basally and dichotomously branching distally; branches angular in cross-section. LEAVES absent or reduced and lacking veins, 1-2 mm long, alternate, and widely spaced. SYNANGIA sessile with three valvate lobes dehisching loculicidally. —2 species and 1 natural hybrid; pantropical. (Name from Greek, *psilos*, naked, referring to the plant's leafless aerial shoots.)

**Psilotum nudum** (L.) P. Beauv. (nude, devoid of leaves or usual covering). Whisk-fern. —Plants terrestrial in AZ. STEMS dichotomously branched to 20 cm, 3-angled, 4 mm in diameter. LEAVES absent or scalelike, less than 1 mm long. SYNANGIA yellowish to greenish yellow, 2-3 mm wide. [*Lycopodium nudum* L.]. —Rocky slopes: Santa Cruz Co.; ca. 1100 m; Jan-Dec; AL, FL, GA, LA, MS, SC, TX; Mex., C. and S. Amer., W. Ind., and Old World Tropics.

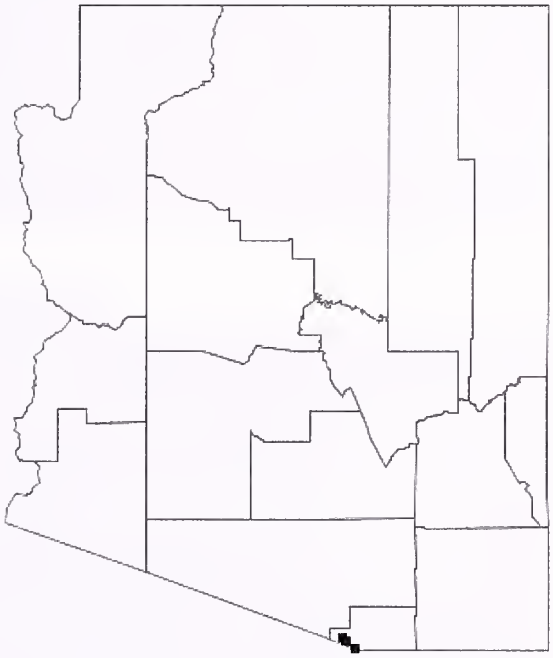
## ACKNOWLEDGMENTS

I thank the curators and staff at ARIZ, ASU, and DES for making specimens available for study. I would also like to acknowledge the anonymous reviewers whose comments have helped to improve the quality of this publication.

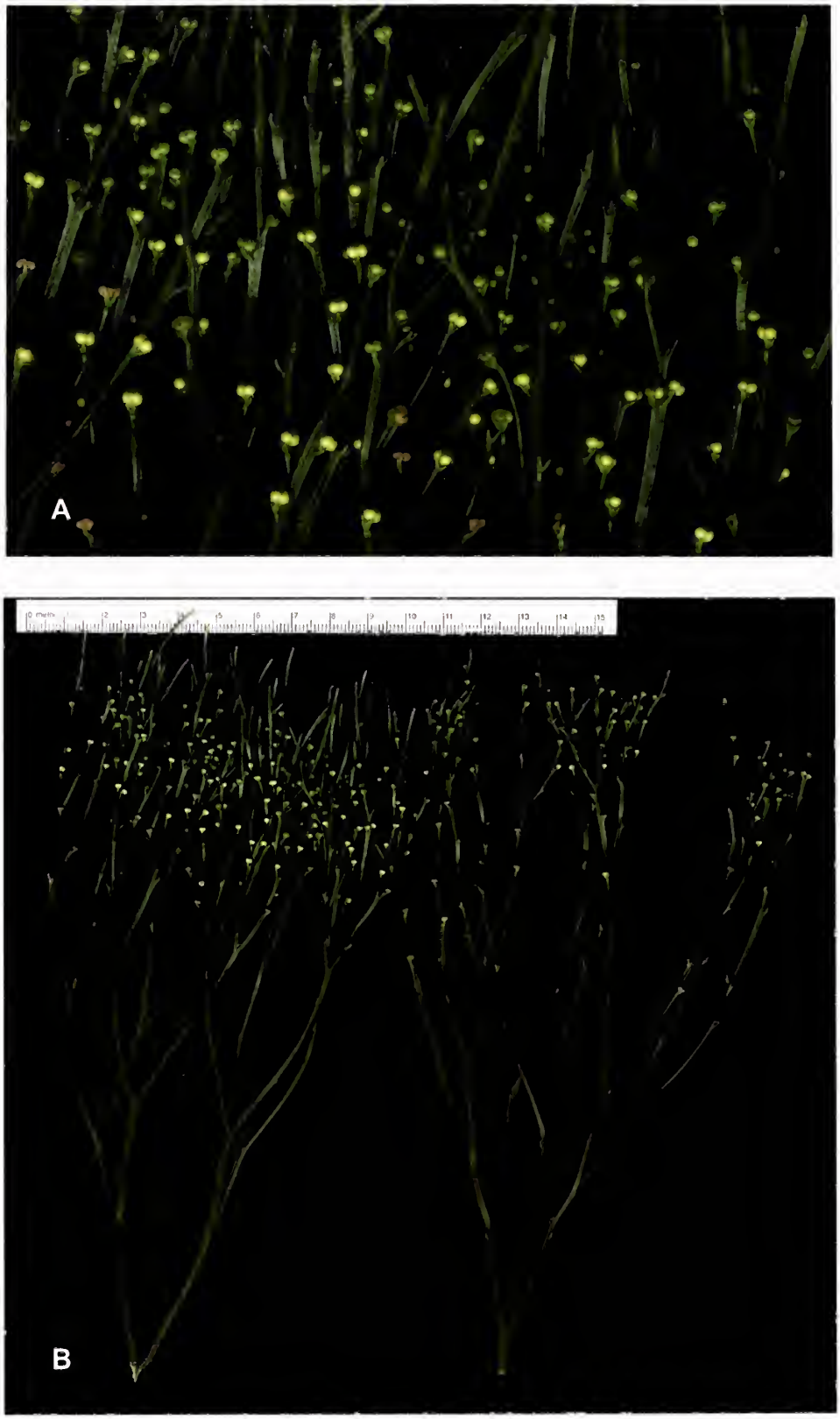
## LITERATURE CITED

THIERET, J.W. 1993. Psilotaceae. *In:* Flora of North America Editorial Committee (eds.). *Flora of North America* 2: 16-17. Oxford University Press, New York.

CORRELL, D.S. and M.C. JOHNSTON. 1970. *Manual of the Vascular Plants of Texas*. Texas Research Foundation, Renner.



**Psilotaceae** Figure 1. Distribution of: *Psilotum nudum*.




**Psilotaceae** Figure 2. *Psilotum nudum*: (A) detail of synangia morphology; (B) entire plant.

New York Botanical Garden Library
3 5185 00261 7841

## Index to Families of the Vascular Plants of Arizona

Bolded treatments are published in volumes 26, 27, 29, 30, 32, 33, and 35 of the *Journal of the Arizona-Nevada Academy of Science* (JANAS) or volumes 1, 2 or 3 of CANOTIA. Unbolded entries indicate families with no treatments published to date. Figure numbers refer to illustrations in the "Key to Families of Vascular Plants in Arizona" in JANAS 35(2).

Acanthaceae (Fig. 3)
**Aceraceae JANAS 29(1): 2. 1995. (L. R. Landrum)**
Adiantaceae (Fig. 1)
**Agavaceae Part 1. JANAS *Agave* 32(1):1. 1999. (W. Hodgson)**
Aizoaceae
Alismataceae
Amaranthaceae (Fig. 4)
**Anacardiaceae CANOTIA 3(2):13. 2007. (J. Anderson)**
Apiaceae (Fig. 5)
**Apocynaceae JANAS 27(2):164. 1994. (S. P. McLaughlin)**
Araceae
Araliaceae
**Arecaceae JANAS 32(1):22. 1999. (C. T. Mason, Jr.)**
**Aristolochiaceae JANAS 32(1):24. 1999. (C. T. Mason, Jr.)**
**Asclepiadaceae JANAS 27(2):169. 1994. (E. Sundell)**
Aspleniaceae
Asteraceae (Figs. 6-7)
Azollaceae
**Berberidaceae JANAS 26(1):2. 1992. (J. E. LaFerriere)** (Fig. 9)
**Betulaceae JANAS 33(1):1. 2001. (J. W. Brasher)**
**Bignoniaceae JANAS 32(1):26. 1999. (C. T. Mason, Jr.)**
**Bixaceae JANAS 27(2):188. 1994. (W. Hodgson)**
Blechnaceae (Fig. 1)
Boraginaceae (Fig. 9)
Brassicaceae
**Bromeliaceae CANOTIA 3(2): 23. 2007. (R. Gutierrez)**
**Buddlejaceae JANAS 26(1):5. 1992. (E. M. Norman)**
**Burseraceae JANAS 32(1):29. 1999. (A. Salywon)**
**Cactaceae Part One. The Cereoid Cacti JANAS 29(1):6. 1995. (D. J. Pinkava)**
**Cactaceae Part Two. *Echinocactus* JANAS 29(1):13. 1995. (M. Chamberland)**
**Cactaceae Part Three. *Cylindropuntia* JANAS 32(1):32. 1999. (D. J. Pinkava)**
**Cactaceae Part Four. *Grusonia* 32(1):48. 1999. (D. J. Pinkava)**
**Cactaceae Part Five. *Pediocactus* and *Sclerocactus* JANAS 33(1):9. 2001. (K. D. Heil and J. M. Porter)**
**Cactaceae Part Six. *Opuntia*. JANAS 35(2):137. 2003. (D. J. Pinkava).**
**Callitrichaceae JANAS 29(1):15. 1995. (J. Ricketson)**
Campanulaceae
**Cannabaceae JANAS 32(1):53. 1999. (C. T. Mason, Jr.)**
Capparaceae (Fig. 8)
Caprifoliaceae (Fig. 10)
Caryophyllaceae (Fig. 10)
**Celastraceae JANAS 30(2):57. 1998. (J. W. Brasher)**
**Ceratophyllaceae JANAS 29(1):17. 1995. (J. Ricketson)**
Chenopodiaceae (Fig. 9)
Clusiaceae
**Commelinaceae JANAS 33(1): 19. 2001. (R. Puente and R. Faden)**
**Convolvulaceae JANAS 30(2):61. 1998. (D. F. Austin)**
Cornaceae
**Crassulaceae JANAS 27(2):190. 1994. (R. Moran)**
**Crossosomataceae JANAS 26(1):7. 1992. (C. Mason)**
Cucurbitaceae (Fig. 10)
**Cupressaceae JANAS 27(2):195. 1994. (J. Bartel)**
Cuscutaceae
Cyperaceae (Fig. 18)
Dennstaedtiaceae (Fig. 1)
**Dipsaceae JANAS 27(2):201. 1994. (J. E. LaFerriere)**
Dryopteridaceae (Fig. 1)
Elaeagnaceae
Elatinaceae
Ephedraceae (Fig. 2)
Ericaceae (Fig. 11)
**Euphorbiaceae Part 1. *Acalypha* and *Cnidoscolus* JANAS 29(1):18. 1995. (G. A. Levin)**
Equisetaceae
Fabaceae (Figs. 12-13)
**Fagaceae JANAS 27(2):203. 1994. (L. R. Landrum)**
**Fouquieriaceae JANAS 32(1):55. 1999. (C. T. Mason, Jr.)**
**Fumariaceae JANAS 33(1):27. 2001. (S. Holiday and A. Perez)**
**Garryaceae JANAS 33(1):31. 2001. (R. Puente and T. F. Daniel)**
**Gentianaceae JANAS 30(2):84. 1998. (C. T. Mason, Jr.)**
Geraniaceae (Fig. 14)
Grossulariaceae
Haloragaceae
**Hippuridaceae JANAS 29(1): 25. 1995. (J. Ricketson)**
Hydrangeaceae
Hydrocharitaceae
Hydrophyllaceae (Fig. 14)
**Iridaceae Part One. *Sisyrinchium* JANAS 27(2):215. 1994. (A. F. Cholewa and D. M. Henderson)**
**Iridaceae Part Two. *Iris* and *Nemastylis* JANAS 33(1):35. 2001. (C. T. Mason, Jr.)**
Isoetaceae
**Juglandaceae JANAS 27(2):219. 1994. (J. E. LaFerriere)**
Juncaceae (Fig. 19)
Juncaginaceae
**Key to Families of Vascular Plants in Arizona JANAS 35(2):88. 2003. (D. J. Keil)**
**Krameriaceae JANAS 32(1): 57. 1999. (B. B. Simpson and A. Salywon)**
**Lamiaceae Part One. *Agastache, Hyptis, Lamium, Leonurus, Marrubium, Monarda, Monardella, Nepeta* L., *Salazaria, Stachys, Teucrium,* and *Trichostema*. JANAS 35(2):151. 2003. (C. M. Christy et al.)**
**Lemnaceae JANAS 26(1):10. 1992. (E. Landolt)**
**Lennoaceae JANAS 27(2):220. 1994. (G. Yatskievych)**
Lentibulariaceae
Liliaceae (Fig. 19)
Linaceae
**Loasaceae JANAS 30(2): 96. 1998. (C. M. Christy)**
Lythraceae
Malpighiaceae
**Malvaceae Part One. all genera except *Sphaeralcea* JANAS 27(2):222. 1994. (P. A. Fryxell)**
Marsileaceae
**Martyniaceae CANOTIA 3(2):26. 2007. (R. Gutierrez)**
Meliaceae
**Menispermaceae JANAS 27(2):237. 1994. (J. E. LaFerriere)**
**Menyanthaceae JANAS 33(1):38. 2001. (C. T. Mason, Jr.)**
**Monotropaceae JANAS 26(1):15. 1992. (E. Haber)**
**Molluginaceae JANAS 30(2):112. 1998. (C. M. Christy)**
Moraceae
Najadaceae
Nyctaginaceae (Fig. 14)
**Nymphaeaceae JANAS 29(1): 26. 1995. (J. Ricketson)**
Oleaceae (Fig. 15)
Onagraceae (Fig. 15)
Ophioglossaceae
Orchidaceae

Orobanchaceae
**Oxalidaceae JANAS 30(2):115. 1998. (R. Ornduff and M. Denton)**
**Papaveraceae JANAS 30(2):120. 1998. (G. B. Ownbey with contributions by J. W. Brasher and C. Clark)**
**Passifloraceae JANAS 33(1):41. 2001. (J. M. MacDougal)**
**Phytolaccaceae JANAS 33(1):46. 2001. (V. Steinmann)**
Pinaceae
**Plantaginaceae JANAS 32(1):62. 1999. (K. D. Huisinga and T. J. Ayers)**
**Platanaceae JANAS 27(2):238. 1994. (J. E. LaFerriere)**
Plumbaginaceae
Poaceae (Fig. 20)
**Polemoniaceae CANOTIA 1: 1-37. 2005. (D. Wilken and M. Porter).**
Polygalaceae
Polygonaceae (Fig. 15)
Polypodiaceae (Fig. 1)
**Pontederiaceae JANAS 30(2):133. 1998. (C. N. Horn)**
**Portulacaceae CANOTIA 2(1):1. 2006. (Allison Bair, Marissa Howe, Daniela Roth, Robin Taylor, Tina Ayers and Robert W. Kiger)**
Potamogetonaceae
**Primulaceae JANAS 26(1):17. 1992. (A. F. Cholewa)** (Fig. 16)
**Psilotaceae CANOTIA 3(2):32. 2007. (R. Gutierrez)**
**Pyrolaceae JANAS 26(1):22. 1992. (E. Haber)**
**Rafflesiaceae JANAS 27(2):239. 1994. (G. Yatskievych)**
Ranunculaceae (Fig.15)
Resedaceae
**Rhamnaceae CANOTIA 2(1):23. 2006. (Kyle Christie, Michael Currie, Laura Smith Davis, Mar-Elise Hill, Suzanne Neal, and Tina Ayers)**
**Rosaceae Part One. *Rubus*. JANAS 33(1):50. 2001. (J. W. Brasher)**
**Rubiaceae 29(1):29. 1995. (L. Dempster and E. T. Terrell)** (Fig. 16)
Ruppiaceae
Rutaceae
**Salicaceae Part One. *Populus* JANAS 26(1):29. 1992. (J. E. Eckenwalder)**
**Salicaceae Part Two. *Salix* JANAS 29(1):39. 1995. (G. W. Argus)**
**Santalaceae JANAS 27(2):240. 1994. (J. E. LaFerriere)**
**Sapindaceae JANAS 32(1):76. 1999. (A. Salywon)**
**Sapotaceae JANAS 26(1):34. 1992. (L. R. Landrum)**
**Saururaceae JANAS 32(1):83. 1999. (C. T. Mason, Jr.)**
**Saxifragaceae JANAS 26(1):36. 1992. (P. Elvander)** (Fig. 16)
Scrophulariaceae (Fig. 17)
Selaginellaceae
**Simaroubaceae JANAS 32(1):85. 1999. (J. W. Brasher)**
**Simmondsiaceae JANAS 29(1):63. 1995. (J. Rebman)**
**Solanaceae Part One. *Datura*. JANAS 33(1):58. 2001. (R. Bye)**
**Sparganiaceae JANAS 33(1):65. 2001. (J. Ricketson)**
Sterculiaceae
Tamaricaceae
Thelypteridaceae
Tiliaceae
**Typhaceae JANAS 33(1):69. 2001. (J. Ricketson)**
**Ulmaceae JANAS 35(2):170. 2003. (J. W. Brasher)**
**Urticaceae JANAS 26(1):42. 1992. (D. Boufford)**
Valerianaceae
Verbenaceae (Fig. 17) **Violaceae JANAS 33(1):73. 2001. (R. J. Little)**
**Viscaceae JANAS 27(2):241. 1994. (F. G. Hawksworth and D. Wiens)**
Vitaceae
Zannichelliaceae
Zygophyllaceae (Fig. 17)